

## CLAIMS

What is claimed is:

1. A method comprising:  
obtaining a data set of a first point cloud and a data set of a second point cloud;  
identifying a portion of geometry defined by each respective data set which describes a substantially similar geometric shape;  
computing a transformation such that the portion of geometry in each data set align to substantially minimize alignment error; and  
applying the transformation to the first point cloud to register it relative to the second point cloud.
2. The method of claim 1 wherein computing comprises:  
generating values for a relative rotation of a portion of the identified geometry within the first and second point clouds respectively.
3. The method of claim 1 wherein computing comprises:  
identifying a relative scale factor between a portion of the identified geometry within the first and second point clouds respectively.
4. The method of claim 1 wherein computing comprises:  
generating values for a relative translation of a portion of the identified geometry within the first and second point cloud respectively.
5. The method of claim 2 wherein computing comprises:  
constructing a rotation matrix for the portion of geometry defined by each respective data set which describes the substantially similar geometric shape.
6. The method of claim 1 wherein computing the transformation comprises:  
calculating a geometric mean of a spatial distribution of the identified portion of geometry of at least one point cloud.
7. The method of claim 1 wherein computing the transformation comprises:  
calculating a centroid of a spatial distribution of the identified portion of geometry of at least one point cloud.

8. The method of claim 1 wherein computing the transformation comprises:  
combining calculations for a relative rotation, scale and translation of the identified portion of geometry of first and second point clouds respectively.
9. The method of claim 1 wherein the first and the second point clouds represent portions of a single physical object.
10. The method of claim 1 further comprising:  
determining a cumulative relative misalignment of the first point cloud and the nth point cloud that results from successively aligning a plurality of point clouds where an nth point cloud joins with the first point cloud; and  
adjusting the alignment of at least one preceding point cloud to compensate for the cumulative relative misalignment.
11. A method comprising:  
obtaining a data set of a first point cloud and a data set of a second point cloud;  
obtaining an image containing texture for a portion of geometry in each respective data set;  
identifying a first portion of the texture and a second portion of the texture associated with each respective data set that represents substantially a same surface;  
computing a relative texture transformation of the first and second data sets such that the portions of texture associated with each data set align to substantially minimize texture alignment error;  
identifying a portion of geometry defined by each respective data set which describes a substantially similar geometric shape;  
computing a relative geometric transformation such that the portion of geometry in each respective data set align to substantially minimize alignment error;  
adjusting the texture transformation based on the geometric transformation; and  
applying the adjusted texture transformation to the first texture to register it relative to the second texture.

12. A computer readable storage medium including program instructions that direct a computer to perform one or more operations when executed by a processor, the one or more operations comprising:

obtaining a data set of a first point cloud and a data set of a second point cloud;

identifying a portion of geometry defined by each respective data set which describes a substantially similar geometric shape;

computing a transformation such that the portion of geometry in each data set align to substantially minimize alignment error; and

applying the transformation to the first point cloud to register it relative to the second.